

ABSTRACT

This invention provides multivalent ligands which carry or display at least one recognition element (RE), and preferably a plurality of recognition elements, for binding directly or indirectly to cells or other biological particles or more generally by binding to any biological molecule. The multivalent ligands provided can most generally function for binding or targeting to any biological particle or molecule and particularly to targeting of cells or cell types or viruses, for cell aggregation and generally for macromolecular assembly of biological macromolecules. The multivalent ligands of this invention are generally applicable for creating scaffolds (assemblies) of chemical or biological species, including without limitation, antigens, epitopes, ligand binding groups, ligands for cell receptors (cell surface receptors, transmembrane receptors and cytoplasmic receptors), and various macromolecules (nucleic acids, carbohydrates, saccharides, proteins, peptides, etc.). In these scaffolds, the number, spacing, relative positioning and relative orientation of recognition elements can be controlled. Multivalent ligands of this invention can carry or display at least one signal recognition element (SRE), and preferably a plurality of signal recognition elements, and modulate biological responses in biological systems. Multivalent ligands of this invention can carry or display at least one binding recognition element (BRE), and preferably a plurality of binding recognition elements, optionally in combination with one or more SRE, and modulate biological responses in biological systems. The invention also relates to methods for aggregating biological particles and macromolecules and for modulating biological response employing the multivalent ligands provided.